

# Strategy Research Project

## Small Unmanned Aerial Vehicles; DHS's Answer to Border Surveillance Requirements

by

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Class of 2013

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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. <b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b></p>					
1. REPORT DATE (DD-MM-YYYY) xx-03-2013		2. REPORT TYPE STRATEGY RESEARCH PROJECT		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Small Unmanned Aerial Vehicles; DHS's Answer to Border Surveillance Requirements				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Lieutenant Colonel Brett M. Clark United States Army				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Professor Sherwood McGinnis Department of National Security and Strategy				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army War College 122 Forbes Avenue Carlisle, PA 17013				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Distribution A: Approved for Public Release. Distribution is Unlimited.					
13. SUPPLEMENTARY NOTES Word Count: 5,651					
14. ABSTRACT <p>Since the terrorist attacks on September 11, 2001, the Department of Homeland Security (DHS) and its many component and sub-component agencies have sought the ability to better secure our borders. Transnational Criminal Organizations and the recent proliferation of the Mexican drug cartels have led to increased illicit narcotics transfer, human trafficking, brutal violence and potential terrorist entry along our nation's border with Mexico. Since 2006, DHS officials have utilized the Predator B UAV system to help provide their intelligence, surveillance and reconnaissance (ISR) requirements on the southern border with some success. The Predator UAV system is expensive, and costs associated with manning, training, and operating may soon become cost prohibitive. The current economic situation and fiscal responsibility demand that DHS reassess its expensive Predator UAV program. With an extensive war-time focus, the UAV industry's technologies, capabilities, and affordability have grown exponentially over the last 5 years. This paper introduces three separate small UAVs (SUAV) that fit the DHS mission requirements at a fraction of the operating costs of Predator. The paper concludes with a recommendation.</p>					
15. SUBJECT TERMS UAV, UAS, SUAV, Raven, Puma, Scan Eagle, Customs and Border Protection, CBP, OAM, ISR					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT  UU	18. NUMBER OF PAGES  32	19a. NAME OF RESPONSIBLE PERSON
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU			19b. TELEPHONE NUMBER (Include area code)



USAWC STRATEGY RESEARCH PROJECT

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## **Abstract**

Title: Small Unmanned Aerial Vehicles; DHS's Answer to Border Surveillance Requirements

Report Date: March 2013

Page Count: 32

Word Count: 5,651

Key Terms: UAV, UAS, SUAV, Raven, Puma, Scan Eagle, Customs and Border Protection, CBP, OAM, ISR

Classification: Unclassified

Since the terrorist attacks on September 11, 2001, the Department of Homeland Security (DHS) and its many component and sub-component agencies have sought the ability to better secure our borders. Transnational Criminal Organizations and the recent proliferation of the Mexican drug cartels have led to increased illicit narcotics transfer, human trafficking, brutal violence and potential terrorist entry along our nation's border with Mexico. Since 2006, DHS officials have utilized the Predator B UAV system to help provide their intelligence, surveillance and reconnaissance (ISR) requirements on the southern border with some success. The Predator UAV system is expensive, and costs associated with manning, training, and operating may soon become cost prohibitive. The current economic situation and fiscal responsibility demand that DHS reassess its expensive Predator UAV program. With an extensive war-time focus, the UAV industry's technologies, capabilities, and affordability have grown exponentially over the last 5 years. This paper introduces three separate small UAVs (SUAV) that fit the DHS mission requirements at a fraction of the operating costs of Predator. The paper concludes with a recommendation.





## **Small Unmanned Aerial Vehicles; DHS's Answer to Border Surveillance Requirements**

The aeroplane is an invention of the devil and will never play any part in such a serious business as the defense of the nation, my boy!

—Sir Sam Hughes, Canadian Minister of Militia and Defense, 1914<sup>1</sup>

The Department of Homeland Security (DHS) was formed after the terrorist attacks of September 11, 2001, as part of a national effort to safeguard the United States homeland from future threats. The DHS is comprised of five separate branches with each branch responsible for a specific security related task. These branches consist of the U.S. Customs and Border Protection (CBP), the U.S. Immigration and Customs Enforcement (ICE), the U.S. Transportation Security Administration (TSA), the U.S. Secret Service and the U.S. Coast Guard (USCG). While each DHS branch has critical components in the overall security of our nation, this paper will focus on the responsibilities of the U.S. Customs and Border Protection, its sub-component agencies and their specific security responsibilities along our nation's southern border with Mexico.

As its name implies, Customs and Border Protection or CBP has the ultimate responsibility for securing our borders. This branch serves as the first line of defense against illegal smuggling and terrorist activity associated with the border. In addition, the CBP also addresses trade issues and is tasked with tariff collection for all incoming and outgoing goods.<sup>2</sup> As a sister branch to the CBP, the U.S. Immigration and Customs Enforcement or ICE is the largest branch of DHS and is responsible for enforcing all laws regarding immigrants and goods coming into the country. It is primarily an investigative branch focused on intelligence and information gathering.<sup>3</sup> The CBP in conjunction with its ICE counterparts is responsible for the security of over 1,950 miles

of the southern border with Mexico including the management and supervision of 46 separate legal crossing stations and gates.<sup>4</sup>

Keeping our borders secure from potential terrorists, illegal immigrants, and illicit contraband is a strategic issue vital to the safety and security of the United States.<sup>5</sup> Since 2006, the illicit trafficking and entrance of illegal aliens and narcotics has shown major growth on our southern border with Mexico. The increased narcotics trafficking, coupled with Transnational Criminal Organizations (TCOs) and their associated violence has elevated the problem to near crisis proportions, jeopardizing the United States' national interests and regional security.<sup>6</sup> Insert this "wicked problem" into the ongoing escalation of Mexican drug cartel crime and one begins to see the enormous challenges that face the Department of Homeland Security and its enforcement agencies diligently working these complex issues.

Truth is, for the past eleven years American attention to the growing threat on our southern border has been overshadowed by the ongoing struggles faced in the wars in Iraq and Afghanistan and more recently, our nation's economic problems, which are only now slowly turning around. It has been stated, that because of the lengthy focus on our current war in Afghanistan, many of our national security experts have largely overlooked the volatile and bitter counter cartel war in Mexico. In his recent essay, "Terror at the Border," Colonel (Retired) Robert Killebrew states, "The drug war in Mexico, which is beginning to overlap the United States southern border, is only the forerunner of an even more serious threat. Sometime in the near future, a lethal combination of transnational terrorism and criminal gangs are going to cross the United

States' southern border in force and according to some, it already has, and we haven't even noticed."<sup>7</sup>

While some argue that it seems unlikely that the dedicated drug cartels would intentionally inflict massive destruction on their highly profitable North American market, others argue that illicit narcotics trafficking and associated violence creates and operates in an environment that readily accommodates non-state actors committed to inflicting massive damage on the United States populous. Thus, tolerance of the seedbed and larger environment in which drug trafficking organizations thrive constitutes an open invitation to politically motivated terrorist activity. It is for this reason that areas of Latin America, including Mexico are considered highly likely bases for future terrorist threats against the United States.<sup>8</sup>

In addition to a possible terrorist threat on our southern border, there are economic ramifications of the drug cartel violence. United States Representative Henry Cuellar (D-TX) and his constituents are not alone when they worry about how cartel violence may affect trade relations and tourism between the United States and Mexico. In border towns from Tijuana / San Ysidro, California to Matamoros / Brownsville, Texas the concern is real and has reached a tipping point. In Laredo, Texas alone, trade between the United States and Mexico is worth more than \$1billion annually.<sup>9</sup> In 2012, Texas Governor, Rick Perry garnered national attention by demanding that President Barack Obama provide National Guard troops to protect the state's southern border.<sup>10</sup> The request failed due to the inability to figure out who would pay for the \$225 million dollar security proposal. Still, Americans are asking that something be done to address this problem which should be addressed sooner than later.

## Unmanned Aerial Vehicles (UAV) to the rescue?

According to staunch UAV proponent and advocate, Representative Cuellar, whose district contains 220 of the 1950 miles of the United States border with Mexico, a UAV can provide increased situational awareness to under-staffed CBP Agents tasked with safeguarding the border from illegal trafficking. In addition, Congressman Cuellar has stated, “These aircraft are a force multiplier for our border law enforcement and they have the endurance and flexibility required to patrol our border while collecting critical information that will protect our communities.”<sup>11</sup> The continued increase in illicit activities requires a greater need for wireless technology to survey the vast areas found on the southern border, and UAVs fit that requirement nicely.

## Are UAVs for DHS a New Concept?

Utilization of UAVs for border security is not a new concept. In fact there are six General Atomics Predator UAVs in use along our southern border. Each UAV has a tailored payload used to gather video surveillance intelligence and transmit it back to ground control stations manned by CBP agents. These remotely-piloted aircraft can fly between 20 and 40 hours at a time depending on flight conditions and at a mission altitude above 15 thousand feet while providing CBP agents with real-time critical intelligence information.<sup>12</sup> There are currently four Predator B aircraft stationed out of Sierra Vista, Arizona and two at Naval Air Station Corpus Christi, Texas. Originally deployed in 2006 as part of the Department of Homeland Security’s Secure Border Initiative (SBI), the Predator B fleet continues to provide under-staffed CBP agents a critical “force multiplying” asset in the effort to secure our southern border. Since its inception in 2006, the CBP’s Predator UAV program has assisted in the apprehension

of more than 4000 illegal aliens, including the seizure of more than 15,000 pounds of marijuana.<sup>13</sup>

In addition to the Predator UAVs being brought on service under the SBI, the Department of Homeland Security in 2006 awarded a contract to Boeing Corporation known as SBInet. SBInet is a system that combines infrastructure and technology utilizing cameras, radars, sensors and towers. The intent of the SBInet contract was to create a network of wireless sensors and cameras for some of the border's more difficult terrain. This network was quickly dubbed the "virtual fence." In theory, the virtual fence would accentuate the CBP agents' capabilities to detect and visually monitor almost 400 miles of our southern border. CBP patrols, manned check points and UAV coverage would monitor and secure the additional 1600 miles of the border. Initial cost estimates for the virtual fence were considerably cheaper than the alternative brick-and-mortar structure or "border-wall" development option. The "border-wall" option had an estimated price-tag of \$7.5 million dollars per mile of wall constructed compared to the \$1 million dollar per mile price-tag for virtual fence technology. However, Homeland Security Secretary Janet Napolitano – citing cost overruns and missed deadlines – announced in March 2010 that work on SBInet would be suspended pending a broad reassessment of the program. At that time, she said that \$50 million dollars in funding originally targeted for SBInet would be diverted to other "tested and commercially available technology."<sup>14</sup>

It is assumed that some of this funding mentioned above found its way to the Predator UAV program through its controlling agency, the Office of Air and Marine. While the Predator UAV program has had success, it has been incredibly expensive.

So expensive and man-hour intensive is the Predator program that many have asked whether the Predator program is cost-effective. The broad reassessment of SBlNet and border security technologies continues today with no quick resolution in sight.

Meanwhile, our southern border with Mexico remains vulnerable and accessible to the ever increasing illicit activity of the TCOs, Mexican drug cartels and human traffickers.

In fact, according to a 2009 Drug Enforcement Agency (DEA) estimate, drugs smuggled through the southern border in Arizona alone will top \$10 billion dollars in annual sales and this figure is projected to increase if left to the current operational abilities of the CBP.<sup>15</sup>

Without doubt, UAV technology is an important part of law enforcement's recognized three-dimensional attack on transnational crime – the movement of people, guns, money and drugs across borders – that currently fuels the multibillion dollar illicit trafficking industry.<sup>16</sup> Border security has been compared to a balloon where illicit activity corridors shift to areas without security. If one pushes on a balloon at one point, a different area of the balloon protrudes out. The same is true with areas or corridors of illicit activity. When one corridor gets hot, typically the CBP answers with increased security forcing those partaking in the illicit activity to find a new corridor of entry.

As technology increases the capabilities of the Department of Homeland Security, the capabilities of those participating in the illicit activity also increase or shift to new ways of doing business. Recently, illicit traffickers have perfected the use of ultra-light aircraft flying at nap-of-the-earth altitudes and carrying up to one hundred pounds of illegal drugs per trip across the border. Traffickers dig highly complex tunnels to and from the United States and Mexico and shift to new tunnels as soon as one of

their tunnels is discovered. Backed by extensive resources and possessing great will, traffickers have even begun to utilize homemade submarines in both the Pacific and the Gulf of Mexico to avoid detection from United States law enforcement. The UAV is aptly suited for a variety of missions as they are capable to cover large areas and can carry multiple sensor payloads that can be tailored to a specific mission. Depending on whether one is searching for the latest trafficking tunnel, looking for an individual or group crossing the border in rugged terrain or trying to target and identify a radio signal, UAV technology can conform to all border security requirements.<sup>17</sup>

As previously mentioned, the current UAV being used on the southern border is the General Atomics Aeronautical Systems' Predator. The DHS Predator UAVs are configured with a satellite-data-link system and as mentioned earlier can loiter above a target for up to 40 hours dependent on the particular flight environment. The Predator is a bit smaller than a small private jet but is considered large in the current realm of UAVs. The DHS Predator payload includes two color video cameras, an infrared camera that offers night vision capability and synthetic aperture radar that provides high resolution video.<sup>18</sup> The DHS Predator currently has authorization to fly in Class A airspace along the border through special approval from the Federal Aviation Administration (FAA). In addition, the DHS Predator has been cleared to operate in all Military Operation Areas (MOA) located within the national airspace so long as prior coordination with the military controlling agency has taken place. Coordination with the FAA outside of the approved MOAs and border area Class A airspace can be a very difficult and effort intensive process.

Drastic change in technology and operations as complex as our national airspace will be challenging but is not impossible. While there are many who believe deconflicting airspace between manned and unmanned aircraft falls within the “too-hard-to-do” category, the United States military has proven otherwise. In fact, for the past 10 years, the U.S. Army, U.S. Air Force, U.S. Navy and the Marines along with our coalition partners have expertly managed the severely congested airspace above Iraq and Afghanistan in countless operations proving manned and unmanned aircraft can safely operate within the same airspace.

#### Will the DHS Predator Fleet become Cost Prohibitive?

As the United States faces its current economic difficulties, shrinking annual budgets required for personnel, operations and training have forced all government agencies to seek out the most cost effective means of accomplishing their individual missions. This fiscal focus will require tough decisions across the board during a time where there seems to be little relief in mission requirements. The Department of Homeland Security and its components such as U. S. Customs and Border Protection are not immune to this fiscal requirement. All agencies will have to look within to trim what could be construed as excess with the intent of decreasing their bottom line. With fiscal responsibility at the forefront, managers throughout each agency will be forced to assess and reassess each of their programs and make positive change where possible thus adhering to the age-old military adage of “doing-more-with-less.”

That said, the Department of Homeland Security’s air and marine assets, controlled by a sub-component of CBP known as the Office of Air and Marine (OAM), have recently come under heavy scrutiny. As of September 2011, OAM had approximately 267 aircraft, 301 marine vessels and 1,843 personnel in 70 separate



locations primarily on the southwest, northern and southeast borders.<sup>19</sup> These numbers do not include resources from the United States Coast Guard.<sup>20</sup> From fiscal years 2006 through 2011, OAM was allocated about \$1.3 billion to modernize its fleet of aging aircraft (UAVs included) and marine vessels with a smaller variety of more flexible and sustainable assets equipped to support homeland security missions.<sup>21</sup> For fiscal year 2011, DHS allocated only \$814.5 million for OAM's overall operations.<sup>22</sup> Considering our nation's current economic environment, the OAM's operating budgets for 2012 and beyond stand to be reduced even more.

While the Predator system has accomplished a great deal in battle proven locations that include Iraq, Afghanistan, the Horn of Africa and America's southern border, the system's initial cost, extensive personnel train-up and maintenance package may soon become cost prohibitive. According to one DHS estimate, the cost of a single Predator UAV is about \$4.5 million dollars.<sup>23</sup> Operating one Predator UAV could take a crew of up to 20 Border Patrol Agents according to the Congressional Research Service (CRS) in a report completed in the summer of 2011.<sup>24</sup> As late as fall 2011, the CBP's Office of Air and Marine estimated the hourly cost of operating one DHS Predator UAV at \$3,234 dollars per hour for border surveillance.<sup>25</sup> Based on this hourly rate, keeping one of the six DHS Predators in the air for every hour of the year would cost in excess of \$28.5 million dollars.<sup>26</sup>

This figure does not address the extensive cost and training man-hours required to operate the Predator system. To learn to fly the Warrior Alpha (U.S. Army's version of the Predator), the Army requires the pilot to obtain a stand-alone Military Occupational Skill (MOS). Obtaining proficiency in this MOS takes nearly one year per

trainee with considerable follow-on training on system to be completed upon arrival at first duty location. The initial training requirements for the DHS Office of Air and Marine Predator System Operator are similar in nature and extensively increase the over-all OAM operations and training requirements costs.

In a recent Government Accountability Office (GAO) report on border security published in March, 2012, the GAO attempted to identify opportunities to ensure more effective use of DHS's air and marine assets. In the report, GAO stated that OAM was unable to meet 27%, or 10,530 of the 38,662 air support requests it received from customers (CBP and ICE) in fiscal year 2010.<sup>27</sup> The primary reason for unmet requests was the number of aircraft in maintenance. Adverse weather and unavailable aircrews were cited as additional factors for lack of support.<sup>28</sup> While the report did not differentiate between manned and unmanned aircraft, unmanned aircraft requests were included in the overall findings. The report did include comments from regional officials and leaders garnered by the GAO during their visits to field locations within a particular region. One Border Patrol Assistant Chief for a southeast region sector stated that OAM had not been responsive to its air support requests. He also stated that in some instances, Border Patrol agents may not have asked for air support in fiscal year 2010 because they thought they might not receive it.<sup>29</sup>

After all, there are only six Predator UAVs in the entire OAM fleet to cover nearly 2000 miles of the southern border. In one southwest location, OAM branch officials said the air assets at their location were barely sufficient to meet support requests for its various missions, and ICE officials said that they would like to see OAM procure better aircraft for their surveillance needs.<sup>30</sup> In addition, Border Patrol officials in the same

southwest location said that while the sector receives substantial OAM air support, OAM as an agency is not adequately resourced in budget, facilities, air frames, or technology to meet operational requirements. Specifically, Border Patrol officials in a southwest border sector told GAO inspectors that there were gaps in OAM's ability to provide air mission support for intelligence, surveillance and reconnaissance (ISR). Similarly, Border Patrol, OAM, and ICE field officials in another southwest region location said OAM lacked the capability to perform effective maritime (air to water) patrols, and ICE officials in their location said that helicopters were often not available on short notice.<sup>31</sup> This aspect is critical for possible surveillance of illicit activity through a Predator UAV over the Pacific or Gulf of Mexico with no helicopter interdiction assets available.

The GAO went on to survey 18 separate OAM air locations for the report and found that 11 of the 18 were either somewhat or very dissatisfied with the extent to which they had adequate air personnel to effectively meet mission needs. In addition, field officials interviewed in the southwest and southeast regions reported shortages in air personnel, and the southwest regional director stated that he did not have adequate personnel to be able to respond 24-hours a day at each of the region's locations.<sup>32</sup> A shortage in air personnel was a common theme throughout the report. For example, the Director of Air Operations at a northern border branch said that the branch was originally slated to have 60 pilots, but instead had 20 pilots due to budgeting constraints. Officials from two branches in the southwest region told GAO inspectors that they lacked personnel due to staff being away for such reasons as temporary duty assignments, military leave, sick leave, and training. They all said that these shortages were negatively affecting their ability to meet air support requests.<sup>33</sup> Further, the GAO

reported that the OAM had in fact taken actions to increase aircraft availability, but the results of their efforts had not been realized. It was noted that OAM had created an aircraft modernization plan in 2006 to replace aging aircraft, and even updated this plan in 2007 with a model of projected investments over the next 10 years. OAM officials reported to GAO that due to changes in mission needs and changes in the aviation market, as well as the ever present issue of limited funding, they have had to modify the plan and continue to maintain older and less supportable aircraft, which require additional maintenance. OAM officials went on to report that because they have not been able to replace aircraft as postulated, they have not been able to standardize their fleet by reducing aircraft types – which would reduce costs associated with training materials and equipment, parts and spares inventories, and personnel requirements (including UAV training and qualifications).<sup>34</sup>

Even though the GAO reported multiple problems concerning personnel, operations management, aircraft maintenance and budget, it is evident that most government agencies are facing many of the same dilemmas in this time of economic belt tightening. Exacerbating this problem is the fact that across the governmental agency spectrum (military included), mission load and operational tempo has increased rather than mirroring the drastic decreases in personnel manning, training, and operational budget.

Is the Utilization of Small Unmanned Aerial Vehicles (SUAVs) at the Agent Level the Solution for Increased Security on our Southern Border?

Companies involved in UAV technologies are constantly enhancing current capabilities and redefining the purpose and mission roles of the unmanned aerial vehicle. Truth be known, the UAV industry is growing so fast that security managers,

law enforcement, and program managers for the military services are unable to keep abreast of the new and developing technologies and capabilities within the UAV sciences. The industry's ever increasing technological growth has recently out-paced would-be customers' ability to test, evaluate and procure new off-the-shelf UAV systems. On the developmental horizon, there is a new class of UAV that will let the aircraft loiter over a particular spot for weeks or even months without coming down for fuel or maintenance. This next generation of UAV is so new that even the UAV industry has yet to agree on its name and classifications, but such prototype designs have been called solar powered, persistent UAVs. On one such solar powered, persistent test flight, the prototype was able to sit above the jet stream at an altitude of more than 20,000 feet for a month in duration.<sup>35</sup>

Lately, the push to develop smaller, more capable, easier deployed and more affordable UAVs has captured the attention of military and civilian law enforcement agencies worldwide. These smaller, more durable systems are packed with the latest technologies found in the much larger UAVs such as the Predator and Warrior Alpha. They are much less man-power and maintenance intensive and require a fraction of the training to operate than do the larger aircraft. The most important fact is that these small UAVs, aptly coined Small Unmanned Aerial Vehicles (SUAVs), can be procured and integrated into an organization's ISR programs for a fraction of what it costs to utilize a UAV like the Predator system that is currently in use at the Department of Homeland Security.

To increase perspective on current SUAV technologies and to offer options to the current DHS UAV program, this paper will introduce three separate examples of

SUAVs. These particular SUAVs were selected for inclusion due to their availability, efficiencies and combat proven abilities to match the border ISR mission requirements of the DHS and should not be considered all inclusive.

The first example SUAV is Insitu Corporation's ScanEagle. This SUAV was developed in partnership with Boeing and is a low-altitude, long-endurance (LALE) aircraft that flies at a mission altitude of approximately 3000 feet. The system features a pneumatic-catapult launch system and a Global Positioning System (GPS) enabled retrieval system that allows a using agency to literally snatch the UAV out of the air. These launch and recovery systems provide the using agency with what is known in the industry as "runway-independence" and allows ScanEagle to be launched and recovered from small ships, unimproved terrain and in remote regions easily conforming to the entire southern border ISR mission (including the Southern California Pacific Ocean, the Baja peninsula and the Texas border with the Gulf of Mexico).<sup>36</sup>

The ScanEagle has an equally capable payload. It features an inertially stabilized camera that can track both fixed and moving objects for extended periods through utilization of an integrated GPS. The ScanEagle weighs in at less than 55 pounds and is capable of remaining "on-station" for more than 24 hours without refueling. The launcher and aircraft can be deployed anywhere by two personnel.<sup>37</sup> When asked about the ScanEagle's capabilities, Paul McDuffee, Insitu's Vice President of Commercial Business Development stated, "This is a vehicle that will go out and fly a prescribed flight path that is uploaded to the aircraft and conduct that path without any intervention from a pilot."<sup>38</sup> McDuffee continued by stating, "ScanEagle is ideal for use

along the border as it is portable, it is mobile and it can be redeployed relatively quickly over fairly significant distances and operate where it is most needed.”<sup>39</sup>

The ScanEagle platform was developed as a tactical surveillance system and can survey between 50 and 100 miles up and down the border at low altitudes. Currently the Department of Defense is Insitu’s main customer because current FAA airspace restrictions limit the use of ScanEagle by commercial and public safety entities; as such entities would be required to obtain FAA approval for special use under a special certificate of operations. However, Insitu leadership remains hopeful that the border states of California, Arizona, New Mexico and Texas will be the first states to acquire the special use certificates from the FAA. Insitu executives believe that ScanEagle’s ability to fly at lower altitudes give it a competitive advantage when it comes to obtaining the FAA’s special use permission and certificate. Paul McDuffie speculates, “If the FAA opens airspace to unmanned aircraft, they are going to do it in an incremental basis – starting small and moving to the larger platforms.”<sup>40</sup> It is very likely that small UAVs will win FAA approval first, over and above the larger UAV platforms like Predator. Doing so would allow the SUAVs to serve as a “test-bed” for incorporating UAVs into manned airspace. Testing airspace compatibility with SUAVs at low altitudes vs. the higher altitudes utilized by manned aircraft and systems like Predator will show that UAVs can, in fact, be integrated safely into manned airspace.

The second example, and another Afghanistan War proven SUAV is the RQ-20A, Puma AE. The Puma was developed by AeroVironment Corporation and is currently deployed at the small unit level in the United States Army. The Puma is the newest addition to the Army’s UAV program and will number 323 separate systems (3

aircraft per system) when fully fielded. Much smaller than ScanEagle mentioned above, the Puma AE weighs just 13 pounds and was designed for combat environments, man portable for ease of mobility, and requires no auxiliary equipment for launch or recovery operations.<sup>41</sup> The system is fully waterproof, is quiet to avoid detection and operates autonomously, providing persistent intelligence, surveillance, reconnaissance and targeting data (ISRT). Puma AE carries both an electro-optical (EO) and infrared (IR) camera on a lightweight mechanically and digitally stabilized gimbaled payload allowing the operator to keep a visual on the target during the entire flight profile. The air vehicle's modular design allows for alternative payload development to meet the needs of specific military or DHS border security applications. The air vehicle is operated from a Ground Control Station (GCS) with a communications range of 15KM and has a flight endurance of 2 hours.<sup>42</sup>

Lastly, and even smaller, the most versatile in the currently available family of UAVs is the RQ-11B, Raven. Like its big brother, the Puma AE, the Raven was also developed by AeroVironment Corporation. Over the past six years, AeroVironment has fielded 1760 Raven systems (3 aircraft per system) to the Army. The Raven system was developed for the company and battalion levels with the intent to enhance situational awareness and increase force protection for those assigned there. Raven is a lightweight solution that was designed for rapid deployment and high mobility for military applications, requiring low-altitude surveillance and reconnaissance intelligence.<sup>43</sup> Like Puma, Raven offers full motion video (FMV). Raven can be operated manually or programmed for autonomous operation, utilizing the system's advanced avionics and precise GPS navigation. With a wingspan of 4.5 feet and a weight of 4.8



pounds, the hand-launched Raven provides aerial observation, day or night, at line-of-sight ranges up to 15 kilometers. The Raven, now available with an optional stabilized gimbaled payload, delivers real-time color (EO) or infrared (IR) imagery to the ground control and remote viewing stations.<sup>44</sup> Man-packed and hand launched, both Raven and Puma deliver video resolution that is on par with the resolution quality delivered by larger air vehicles like the Predator and Warrior Alpha systems. While this may seem like a bold statement, it is possible because both Raven and Puma fly 20 times closer to the target than the Predator air vehicle (300ft mission flight altitude for Raven and Puma vs. a 12,000ft AGL or higher mission flight altitude of Predator).<sup>45</sup> To ease system continuity and to provide interchangeable technology, both Raven and Puma use the same hand controller touch book. Also, as all fielded systems come complete with two separate hand controller touch books, one user can fly the air vehicle while the other can be viewing the collected real time video.<sup>46</sup>

From a connectivity standpoint, the U.S. Army uses a generic video terminal capable of receiving the live feed from the air vehicles called the One Station Remote Video Terminal (OSRVT). This asset has been a force multiplier as anyone with an OSRVT can receive the live feed being gathered from the deployed air vehicle. This battlefield technology sharing capability could have great applicability within DHS and component organizations. This live video share capability is transmitted Omni-directionally from the air vehicle and can be received on the OSRVT as long as the receiver is within ~15Kilometers of the air vehicle.<sup>47</sup> In comparison to the Predator system training requirements of having to attend a lengthy Military Occupational Skill (MOS) producing course, the Raven and Puma systems require attendance at a 10-day

training course offered by AeroVironment. For the U.S. Army, the requirement for attendance to the RQ-11B Raven course is branch-immaterial, meaning any Soldier can attend the training and then utilize the asset (not MOS or Aviation related specific). This aspect alone could save thousands of training dollars in the resource challenged Office of Air and Marine.

Finally, when comparing initial costs and operational flying costs per hour between the Predator, the Puma and the Raven...there really is no *comparison*. The initial cost of a Predator air vehicle was estimated by the DHS at \$4.5 million per copy with an hourly operational cost of \$3,234. Comparing these numbers with initial costs of a Puma system (2 controllers and 3 air vehicles) of approximately \$350 thousand dollars per system and again with the cost of a Raven system (2 controllers and 3 air vehicles) of \$135 thousand dollars, the operational price per hour for both Puma AE (~\$50 per hour) and Raven (~\$37 per hour) systems are but a fraction of the hourly operating rate of Predator, while granting comparable video resolution to the mission package currently found on DHS's Predator fleet .<sup>48</sup>

### Conclusion

The Department of Homeland Security and its many component and sub-component agencies face multiple fiscal and mission related challenges in the days ahead, and their ability to correctly identify areas in their formations that require change will be critical to the continued security of our southern border. While the overall capabilities and mission usefulness of the DHS Predator system is not in question, its high cost to man, maintain, and train required personnel is. Like all other government agencies, the U.S. Department of Defense (DOD) included, the Department of Homeland Security must reassess the fiscal effectiveness of all operational assets.

## Recommendation

It is recommended that the Department of Homeland Security shift its current focus from Predator system operations along our southern border to a much more efficient Small Unmanned Aircraft Vehicle (SUAV) fleet. This paper has identified several capable and available SUAVs as a possible solution to some of the critical issues outlined in the recent GAO report mentioned earlier. Shifting focus from the larger and more expensive Predator to a smaller more effective SUAV for our border ISR responsibilities is not to be considered the “cure-all” for every issue that DHS and her component agencies currently face. However, if accepted, selecting a capable SUAV comparable to the ones mentioned above (ScanEagle, Puma AE or Raven) would increase efficiencies in manning, training, UAV availability and utilization.

In addition, tapping into the lower altitudes that SUAVs utilize in FAA controlled airspace could solve many airspace coordination issues prevalent in deconflicting airspace for the much larger Predator flying at much higher altitudes. Outfitting CBP agents along the southern border will increase user agent’s situational awareness on the ground and will increase individual agent safety. Ultimately, shifting from large to small UAVs will increase DHS’s ability to protect and secure our southern border while decreasing its total operational budget. Realized cost savings could be utilized to man, train and field enough SUAVs to provide proper ISR coverage of our southern border. The paper’s selection of possible SUAVs is by no means all inclusive given what is currently available or being developed on the civilian market.

While any of the three battle proven SUAV systems mentioned above could provide increased efficiencies to the DHS, AeroVironment’s Raven stands to serve as the most cost effective SUAV to field, man, train and operate. Cost savings of

implementing the Raven in comparison to continued utilization of the Predator system for DHS's border ISR responsibilities would be exponential. Full implementation and procurement of a SUAV program for DHS would require complete assessment of DHS requirements and current SUAV technologies. Program assessment focus needs to begin at the CBP's Technology, Innovation & Acquisition Assistant Commissioner level of leadership and should include the CBP's Training & Development Assistant Commissioner as well. Information sharing with the Military Services UAV/UAS Program Managers on SUAV systems and training could immensely help with organizational implementation.

SUAVs are an asset whose time has come. Current SUAV technology, capability and affordability dictate that Small Unmanned Aerial Vehicles are in fact, the Department of Homeland Security's answer to its southern border intelligence, surveillance and reconnaissance requirements.

## Endnotes

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<sup>17</sup> *Ibid.*, 29.

<sup>18</sup> *Ibid.*

<sup>19</sup> United States Government Accountability Office (GAO), Report to Congressional Requesters, *Border Security: Opportunities Exist to Ensure More Effective Use of DHS's Air and Marine Assets*, GAO-12-518, (March 2012), 1.

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<sup>21</sup> *Ibid.*

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<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

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<sup>27</sup> United States Government Accountability Office, 16.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid., 18.

<sup>30</sup> Ibid.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid., 19.

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